PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application	: **10/599,347**	Applicant(s)	: **Kuiper et al.**
Filed	: **9/26/2006**	Confirmation	: **7199**
T.C./Art Unit	: **2627**	Examiner	: **Ortiz Criado, Jorge L.**

Atty. Docket : **NL 041186 [MS-378]-Appeal Brief**

Title: **COMPACT SWITCHABLE OPTICAL ELEMENT**

Mail Stop: **Appeal Brief-Patents**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Sir:

Appellant herewith respectfully presents its Brief on Appeal as follows:

I. REAL PARTY IN INTEREST

The real party in interest is Koninklijke Philips Electronics N.V., a corporation of The Netherlands having an Office and a place of business at Groenewoudseweg 1, Eindhoven, Netherlands 5621 BA. Koninklijke Philips Electronics N.V. is the parent company of the assignee of record U.S. Philips Corporation, a Delaware corporation having an Office and a place of business at 345 Scarborough Road, Briarcliff Manor, New York, 10510-8001.

II. RELATED APPEALS AND INTERFERENCES

To the best of Appellants' knowledge and belief, there are no currently pending related appeals, interferences or judicial proceedings.

III. STATUS OF CLAIMS

Claims 1-28 are pending in this application. In the Final Office Action that mailed August 4, 2009, Claim 27 is allowed, Claims 12-14 stand objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form, Claims 1-26 and 28 stand rejected, Claims 21, 24, 25 and 28 would be allowable if they overcome the double patenting rejections and Claims 22 and 23 would be allowable if rewritten to overcome the rejections under 35 U.S.C. 112, 2nd paragraph. In the Advisory Action that mailed October 27, 2009, Claims 21-28 were subsequently allowed, the objection to Claims 12-14 was maintained and the rejection of Claims 1-11 and 15-20 was maintained.

IV. STATUS OF AMENDMENTS

In an Amendment filed October 5, 2009, in response to the Final office Action mailed August 4, 2009, claims 1-2 and 3-28 were amended. This Appeal Brief is in response to the Final office Action that rejected Claims 1-26 and 28 and the Advisory Action that upheld that rejection in part by allowing Claims 21-28, upholding the rejection of Claims 1-11 and 15-20, and upholding the objections to Claims 12-14.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claimed subject matter relates to a switchable optical unit capable of controlling a beam of radiation passing through an optically active portion of the unit, which unit comprises a chamber and an electrically conducting liquid contained in the chamber and having an index of refraction different from its surroundings. The chamber is provided with an electrode configuration, wherein application of a voltage, from a voltage control system, to electrodes, causes movement of the liquid. The electrode configuration comprises a pair of first, central electrodes fixed to the inner walls of the chamber at a position of the optically active portion. The electrode configuration further comprises second electrode means fixed to the inner walls of the chamber at positions outside the optically active portion and a third electrode in contact with the liquid. A third electrode is continuously connected to a first output of the voltage source. In a first mode of operation, a second output of the voltage source is connected to at least one of the first electrodes. In a second mode of operation, the second output voltage is connected to the second electrode means. In accordance with the first mode of operation, when the second output of the voltage source is connected to at least one of the first electrodes, the conductive liquid is attracted by the first pair of electrodes so that the liquid is positioned in the optically active portion of the device. In the case where the liquid chamber is arranged between refractive surfaces of a lens system, the device has a first optical power, which is determined by the refractive index of the conductive liquid and the curvature of the lens surfaces. In a second mode of operation, when the second output of the voltage source is connected to the second electrode means, the conductive liquid is attracted by the second electrode means so that the liquid is positioned outside the optically active portion. In this case, the device has a second optical power, which is determined by the refractive index of the medium that has replaced the polar

liquid. The medium may be, for example, a liquid or a gas. The switchable optical unit is characterized as having a simple and compact construction that can be driven by a relatively low voltage, thereby opening the way to new applications.

The subject matter, as recited in independent claim 1, relates to a switchable optical unit capable of controlling an external beam of radiation passing through an optically active portion of the unit. In particular, the subject matter of claim 1 relates to a switchable optical unit capable of controlling an external beam of radiation passing through an optically active portion of the unit, wherein the optically active portion comprises a region through which the beam of radiation passes through the switchable optical unit, which unit comprises a chamber and an electrically conductive liquid contained in the chamber, the chamber being provided with an electrode configuration wherein application of a voltage (V), from a voltage control system to electrodes causes movement of the said liquid, characterized in that the electrode configuration comprises: at least one first electrode fixed to the inner walls of the chamber at the position of the optically active portion, second electrode means fixed to the inner walls of the chamber at positions outside the optically active portion and a third electrode in contact with the conductive liquid and continuously connected to a first output of a voltage source, a second output of which is connected in a first mode to said at least one first electrode and in a second mode to the second electrode means, and wherein in a first mode, the electrically conductive liquid fills the chamber inside the optically active portion, and wherein in a second mode, the electrically conductive liquid fills the chamber outside of the optically active portion.

Support in the specification for claims 1-20 can be found as follows:

Claim 1 (See page 1, lines 1-3 and page 2, line 8 and lines 22-29);

Claim 2 (See page 3, lines25-26);

Claim 3 (See page 3, lines 30-33,);

Claim 4 (See page 4, lines 1-2);

Claim 5 (See page 1, lines 1-4, page 4, lines 8-9, page 8, lines 15-17);

Claim 6 (See page 4, line 10-11, page 9, lines 2-3, page 11, lines 16-17);

Claim 7 (See page 4, line 22, page 9, 1-4, page 11, lines 17-18, page 14, lines 1-3);

Claim 8 (See page 4, lines 23-24, page 9, lines 3-6, page 11, lines 19-21);

Claim 9 (See page 4, lines 17-19);

Claim 10 (See page 4, lines 20-21);

Claim 11 (See page 4, lines 25-26, page 12, lines 1-2);

Claim 12 (See page 5, lines 4-6);

Claim 13 (See page 12, lines 19-22, page 14, lines 21-25, page 15, lines 14-30 through page 16, line 5, page 24, lines 3-4);

Claim 14 (See page 5, lines 16-17, page 12, lines 19-22, page 24, lines 3-4);

Claim 15 (See page 6, lines 10-12);

Claim 16 (See page 6, lines 20-22)

Claim 17 (See page 18, line 14-24);

Claim 18 (See page 18, line 25-31 through page 19, line 3);

Claim 19 (See page 5, lines 24-25, page 25, lines 10-12);

Claim 20 (See page 6, lines 1-3);

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether Claims 1-8, 15-16 and 19-20 are unpatentable under 35 U.S.C. §103 over W002/099527 ("Prins") in view of U.S. Patent No. 4,701,021 ("Le Pesant).

The Appellants respectfully request the Board to address the patentability of independent claim 1. This position is provided for the specific purpose and stated purpose of simplifying the current issue on appeal. However, the Appellants herein specifically reserve the right to argue and address the patentability of each of the further claims at a later date should the separately patentable subject matter of those claims at a later date should the separately patentable subject matter of those claims later become an issue. Accordingly, this limitation of the subject matter presented for appeal herein, specifically limited to discussions of the patentability of claim 1 is not intended as a waiver of Appellants' right to argue the patentability of the further claims and claim elements at that later time.

VII. ARGUMENT

Appellants hereby respectfully present to the Board of Patent Appeals and Interferences the following arguments in support of their positions that Claims 1-8, 15-16 and 19-20 are patentable over the teachings of Prins and Le Pesant, taken alone or in any proper combination.

I. REJECTION OF CLAIMS 1-8, 15-16 and 19-20

I.A. Patentable Differences between Appellants' claim recitations and the combination of Prins and Le Pesant.

As presented and argued in the response to the Final office Action mailed on August 4, 2009, Appellants contend that there are patentable differences between Appellants' recitations in independent Claim 1 and the combined teachings of Prins and Le Pesant. The position of the Office taken in the Final Action, as understood by Appellants, is that Le Pesant is cited to cure a deficiency in Prins. Specifically, it is asserted by the Office that Prins does not disclose an arrangement where the beam of radiation passes through the switchable optical unit and that wherein in a first mode, the electrically conductive liquid fills the chamber inside the optically active portion, and wherein in a second mode, the electrically conductive liquid fills the chamber outside of the optically active portion, having a chamber and an electrically conductive liquid contained in the chamber, the chamber being provided with an electrode configuration wherein application of a voltage (V), from a voltage control system to electrodes causes movement of the liquid. The Office asserts that such an arrangement is known in the art as evidenced by Le Pesant. Specifically, the Office asserts that Le Pesant discloses an optical switching unit capable

of controlling an external beam of radiation passing through an optically active portion of the unit and that wherein in a first mode, the electrically conductive liquids fill the chamber inside the optically active portion, and wherein in a second mode, the electrically conductive liquid fills the chamber outside the optically active portion.

1.B Le Pesant cannot teach the recitations of claim 1

Appellants' independent Claim 1 rejected under 35 U.S.C. §103(a) recites "*wherein in a first mode, the electrically conductive liquid fills the chamber inside the optically active portion, and wherein in a second mode, the electrically conductive liquid fills the chamber outside of the optically active portion*".

It is respectfully submitted that Le Pesant does not disclose an optical switching unit capable of controlling an external beam of radiation passing through an optically active portion of the unit and that wherein in a first mode, the electrically conductive liquids fill the chamber inside the optically active portion, and wherein in a second mode, the electrically conductive liquid fills the chamber outside the optically active portion, as required by Applellant's independent claim 1.

In contrast to claim 1, Le Pesant teaches the use of non-electrically conductive liquids (e.g., hydrocarbons) in accordance with a method that does not operate according to the electro-wetting principle. Accordingly, Le Pesant cannot teach the claim 1 recitation: "*wherein in a first mode, the electrically conductive liquid fills the chamber inside the optically active portion, and wherein in a second mode, the electrically conductive liquid fills the chamber outside of the optically active portion*" (Emphasis Added).

1.C The Invention operates according to the electro-wetting principle.

The compact switchable optical unit of the invention operates in accordance with the electro-wetting principle that requires the use of electrically conductive liquids. In operation, when a second output of a voltage source is connected to the at least one first electrode, a conductive liquid is attracted by the at least one first electrode, in accordance with the electro-wetting principle, so that the liquid is positioned in the optically active portion of the device. In the case where the liquid chamber is arranged between refractive surfaces of a lens system, the unit then has a first optical power, which is determined by the refractive index of the conductive liquid and the curvature of the lens surfaces. When a second output of the voltage source is connected to second electrode means, the conductive liquid is attracted by the second electrode means so that the conductive liquid is positioned outside the optically active portion. The device then has a second optical power, which is determined by the refractive index of a medium that has replaced the polar liquid. It should be emphasized that the method of the invention, as described, is not operable with insulating liquids, such as those taught in Le Pesant. This is true because an insulating liquid will not produce the necessary electro-wetting effect. It is well known in the art that electro-wetting involves modifying the surface tension on a solid surface using a voltage. By applying a voltage, the wetting properties of a hydrophobic surface can be modified and the surface becomes increasingly hydrophilic (wettable). The electrowetting effect can reasonably be defined as "the change in solid electroylte contact angle due to an applied potential difference between the solid and the electrolyte". The phenomenon of electrowetting can be understood in terms of the forces that result from the applied electric field.

I.D Teachings of Le Pesant

The optical modulator of Le Pesant does not operate in accordance with the electro-wetting principle. That is, Le Pesant does not teach or suggest the use of an electrically conductive liquid that fills the chamber inside the optically active portion and fills the chamber outside of the optically active portion. Instead, the optical modulator of Le Pesant utilizes insulating liquids. Le Pesant discloses an optical modulator for a light beam using the electrically controlled fluid displacement cells constituted by two parallel transparent plates, defining a capillary space connected to a reservoir containing at least one fluid, as well as to devices for applying electrical fields making it possible to control the displacement of the liquid between the reservoir and the capillary space, comprising at least one cell of a first type, whose transparent plates are positioned perpendicular to the direction of the beam, the capillary space being in the section of the beam and the fluid f2 of the cell being absorbent. See Le Pesant, col. 1, lines 60-67 through col. 2, lines 1-3.

Applicants respectfully submit that the optical modulator of Le Pesant employing two parallel transparent plates defining a capillary space and devices for applying electrical fields to control the displacement of an insulating liquid between a reservoir and the capillary space operates on a different principle than the electro-wetting principle of the invention for causing an electrically conductive liquid to fill the chamber inside the optically active portion and fill the chamber outside of the optically active portion, as claimed in independent claim 1.

It is particularly emphasized that the insulating liquids used by Le Pesant are different from the electrically conductive liquids of the invention. Specifically, Le Pesant teaches that Fluids 1f2 and 2f2 are chosen so that their permittivity differs from that of fluid f_1, which can be air. Moreover, it is advantageous for the liquid to be displaced to be slightly corrosive and only

have a limited electrical conductivity. Le Pesant further discloses that the fluid f2 can be chosen from among the hydrocarbons, such as alkanes, containing 5 to 25 carbon atoms, ketones (acetone, cyclohexanone, methyl ethyl ketone) or nitro derivatives (nitrobenzene, nitrotoluene). See Le Pesant, col. 2, lines 45-50. Appellants note that hydrocarbons are by definition insulating. In fact, U.S. Patent 4,681,980 is directed to a method for improving the electrical characteristics of an electrical insulating hydrocarbon suitable for use in oil-filled electrical appliances.

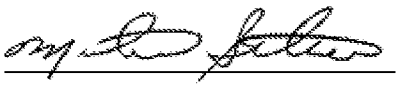
Further, if the method of Le Pesant were substituted into the arrangement of Prins, as suggested by the Office, the result would be impractable. This is true because the capacitive arrangement i.e., non-electrowetting approach, of Le Pesant would require thousands of volts to fill the hollow chamber of Prins. This is due to the voltage having to be applied over the entire cavity. In contrast, the invention only requires a small voltage, on the order of 10V, because it is only applied over a thin insulator, which is independent of the cavity dimensions. The method of Le Pesant is only operative for the described arrangement of two parallel plates that are very closely separated, e.g., on the order of 10 micrometers. It should be understood that this is insufficient to make switchable lenses.

Accordingly, Appellants' Claims 1-8, 15-16 and 19-20 are patentable over the teachings of Prins and Le Pesant, alone and in combination, and allowance thereof is respectfully requested.

CONCLUSION

For all of the foregoing reasons, it respectfully is submitted that the Examiner has failed to make out a *prima facie* case of obviousness and hence the rejection of claims 1-8, 15-16 and 19-20 35 USC § 103 should be reconsidered and reversed.

Respectfully submitted,



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CLAIMS APPENDIX

CLAIMS ON APPEAL

1. A switchable optical unit capable of controlling an external beam of radiation (b) passing through an optically active portion of the unit,

wherein the optically active portion comprises a region through which the beam of radiation passes through the switchable optical unit, which unit comprises a chamber and an electrically conductive liquid contained in the chamber,

the chamber being provided with an electrode configuration wherein application of a voltage (V), from a voltage control system to electrodes causes movement of the said liquid, characterized in that the electrode configuration comprises:

at least one first electrode fixed to the inner walls of the chamber at the position of the optically active portion,

second electrode means fixed to the inner walls of the chamber at positions outside the optically active portion and a third electrode in contact with the conductive liquid and continuously connected to a first output of a voltage source, a second output of which is connected in a first mode to said at least one first electrode and in a second mode to the second electrode means, and

wherein in a first mode, the electrically conductive liquid fills the chamber inside the optically active portion, and

wherein in a second mode, the electrically conductive liquid fills the chamber outside of the optically active portion.

2. A switchable optical unit as claimed in claim 1, wherein the second electrode means includes one annular electrode having a U-shaped cross-section.

3. A switchable optical unit as claimed in claim 1, wherein the second electrode means includes one flat annular electrode.

4. A switchable optical unit as claimed in claim 1, wherein the interior wall of the chamber facing the liquid is coated with an insulating hydrophobic layer.

5. A switchable optical unit as claimed in claim 1, wherein the chamber comprises a medium contained in the chamber which has an index of refraction different from that of the conductive liquid.

6. A switchable optical unit as claimed in claim 5, wherein the medium is a liquid.

7. A switchable optical unit as claimed in claim 5, wherein the medium is a gas.

8. A switchable optical unit as claimed in claim 1, wherein a liquid free portion of the chamber is at vacuum.

9. A switchable optical unit as claimed in claim 1, comprising at least one lens element wherein at least one chamber wall situated in the optically active portion includes a refractive lens surface.

10. A switchable optical unit as claimed in claim 9, wherein each of two opposite chamber walls situated in the optically active portion ~~(8)~~ includes a refractive lens surface.

11. A switchable optical unit as claimed in claim 9, wherein at least one of the refractive lens surfaces is an aspherical surface.

12. A switchable optical unit as claimed in claim 1, wherein at least one chamber wall situated in the optical active portion is provided with a phase structure.

13. A switchable optical unit as claimed in claim 12, wherein the phase structure is a non-periodical structure, which renders the unit to a wavefront- modifying unit

14. A switchable optical unit as claimed in claim 12, wherein the phase structure is a periodical structure.

15. A switchable optical unit as claimed in claim 1, wherein the voltage control system is arranged to supply a voltage to the at least one first electrode individually.

16. A switchable optical unit as claimed in claim 1, wherein the index of refraction of the electrically conductive liquid is equal to that of the optically relevant material of the chamber wall.

17. An optical camera including a controllable lens system, wherein the lens system comprises a switchable optical unit as claimed in claim 1.

18. A hand-held apparatus including an optical camera as claimed in claim 17.

19. A switchable optical unit as claimed in claim 1, wherein at least one chamber wall situated in the optically active portion includes a planar surface.

20. A switchable optical unit as claimed in claim 19, wherein each of two opposite chamber walls situated in the optically active portion includes a planar surface.